ENVIRONMENTAL PRODUCT DECLARATION

DINOFLEX

P.O. Box 3309
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Salmon Arm, B.C.,
Canada V1E4S1

PRODUCTS:

PlayTiles, NuVista Tiles, CushionWalk Pavers,
and Stride Fitness Tiles

Dinoflex has been a leading innovator in manufacturing recycled rubber products for over two decades, specializing in producing rubber flooring, surfaces, tiles, and custom products. Dinoflex's process produces a range of richly colored flooring suitable for a multitude of sport and commercial applications that can be customized with logos and designs. Dinoflex's rubber tile goods contain recycled rubber that help to reduce waste and environmental impact, with many of its products having earned third-party certifications for compliance with environmental standards.

FUNCTIONAL UNIT

1 m^2 of floor covering provided and maintained for a period of 60 years.

EPD NUMBER AND PERIOD OF VALIDITY

SCS-EPD-03590
Valid: December 8th, 2015 - December 7th, 2020

PRODUCT CATEGORY RULE

Product Category Rule (PCR) for preparing an Environmental Product Declaration (EPD) for Flooring: Carpet, Resilient, Laminate, Ceramic, Wood, Version 2.

PROGRAM OPERATOR:

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VERIFIED by SCS GLOBAL SERVICES ™
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

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Disclaimers: *This EPD conforms to ISO 14025, 14040, ISO 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

PCR review, was conducted by	Jack Geibig, Ecoform, jgeibig@ecoform.com
Valid: December 8th, 2015 - December 7th, 2020	
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 21930:2007.	☐ internal ☑ external
Third party verifier	Thomas Gloria, Industrial Ecology Consultants

PRODUCT DESCRIPTION:

PlayTiles are outdoor surfacing tiles specifically designed to reduce injuries from falls, which are ideal for schools, parks, daycares, and backyards. The interlocking system allows for the installation over concrete or compacted gravel without the need for adhesive. These low maintenance tiles are water permeable and slip resistant even when wet and have the option of incorporating designs and symbols to the surface. Dinoflex PlayTiles meet ASTM F1292 – Impact attenuation and ADA Standards for accessibility.

NuVista Tiles provide noise reduction and slip resistant surfacing for rooftop patios, decks, or walkways. They can be installed over concrete, asphalt, or a compacted granular base at grade or over many types of roof surfaces without adhesive due to its interlocking tile system. The recycled content combined with the reduction of water flow to roof drains allow this product to contribute to LEED points.

CushionWalk Pavers are resilient and long-lasting tiles for covering patios and walkways. These tiles are impact absorbent, noise reducing, and spike and slip resistant, which result in them being chosen for senior care, exterior restaurant patios, and many other applications. Dinoflex CushionWalk Pavers are available in both loose lay interlocking and glue down non-interlocking options.

Stride Fitness Tiles are ideal for fitness centers and workout areas located over occupied space. The tiles are sound and impact absorbing, stain resistant, durable, require minimal maintenance, and are available in a full selection of standard colors with custom colors available upon request. The interlocking system simplifies installation. The Dinoflex Stride Fitness Tiles are FloorScore certified and qualifies for LEED credits.

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PRODUCT APPLICATIONS:

Table 1. *Typical applications for Dinoflex tiles.*

Product	Applications
PlayTiles	Schools, parks, day cares, preschools, backyards, play areas, climbing walls
NuVista Tiles	Rooftop patios, decks, walkways, schools, office buildings, condominiums, apartment complexes, restaurants, and health care facilities
CushionWalk Pavers	Golf clubs, retail stores, senior citizen areas, ski lodges, restaurant decks and patios, ice arenas, park and campgrounds, outdoor decks, residential landscaping, fitness areas, rooftops, patios, walkways, temporary ground cover, protective coverings
Stride Fitness Tiles	Gym flooring, free weight areas, spinning areas, fitness centers, recreation centers

MATERIAL CONTENT:

Table 2. *Origin and availability of materials in the Dinoflex tiles.*

Component	Materials	Availability			Origin of Raw Materials
		Renewable	Non-Renewable	Recycled	
Layer	Rubber, SBR		Fossil, Limited	Fossil, Limited	Global
Layer	Rubber, EPDM		Fossil, Limited	Fossil, Limited	Global
Layer	Rubber, Regrind			Fossil, Limited	Canada
Adhesive	Polymer Binder		Fossil, Limited		Global
Catalyst	Chemicals, Organic		Fossil, Limited		Canada
Additive	Water	Region Dependent			Canada
Coloring	Pigment		Fossil, Limited; Mineral Resource, Limited		Global

Table 3. *Material content of Dinoflex tile flooring products.*

Component	Materials	Mass %			
		PlayTiles	NuVista Tiles	CushionWalk Pavers	Stride Fitness Tiles
Layer	Rubber, SBR	77-90%	3.3-18%	56-90%	80-90%
Layer	Rubber, EPDM	9.7-14%	15%	34%	10%
Layer	Rubber, Regrind	0%	72%	0%	0%
Adhesive	Polymer Binder	8.9-9.7%	8.8-9.4%	9.6-9.8%	2.9-8.8%
Catalyst	Chemicals, Organic	0.13-0.45%	0.21-0.22%	0.07-0.17%	0.23-6.4%
Additive	Water	0.30-0.66%	0.55-0.57%	0.11%	0.52-0.69%
Coloring	Pigment	0.40-1.2%	0%	1.8%	0%

The following regulated hazardous chemicals may be present based on a review of Material Safety Data Sheets for the product component materials:

- 4,4'-Diphenylmethane Diisocyanate (CAS #101-68-8)

PRODUCTION OF MAIN MATERIALS:

Catalyst: A substance derived from petroleum feedstock that increases the rate of a chemical reaction without itself undergoing any permanent chemical change.

Pigment: Powdered organic, inorganic, metal-based, or biological substance that is mixed with a liquid in which it is relatively insoluble and used to impart color to a substrate.

Polymer Binder: Derived from petroleum feedstock that is used to adhere particles such as rubber crumb and other solids together to form a final composite structure.

Rubber, EPDM: A synthetic elastomer produced as a copolymer of ethylene and propylene, with small amounts of a cross-linking agent.

Rubber, Re-grind: Re-grind is made from post-consumer recycled rubber ground to specification.

Rubber, SBR: A resilient material derived from two petroleum-based monomers, styrene and butadiene, forming styrene-butadiene.

Water: The most widely used of all solvents. It is a natural resource that may be delivered from a public or private supplier, or be self-supplied.

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PRODUCT CHARACTERISTICS:

Table 4. *Product characteristics for PlayTiles.*

2.64 ft² Tile						
Characteristics			Average Value	Unit	Minimum Value	Maximum Value
Product Thickness:			63.5 (2.50)	mm (inch)	38.1 (1.50)	88.9 (3.50)
Product Weight:			42,600 (140)	g/m² (oz/ft²)	30,700 (101)	54,600 (179)
Product Form:	Tiles	Dimension:	495 (19.5)	mm (inch)	495 (19.5)	495 (19.5)
VOC Emissions Test Method:			California 01350			
4.00 ft² Tile						
Product Thickness:			63.5 (2.50)	mm (inch)	38.1 (1.50)	88.9 (3.50)
Product Weight:			42,600 (140)	g/m² (oz/ft²)	30,700 (101)	54,600 (179)
Product Form:	Tiles	Dimension:	610 (24.0)	mm (inch)	610 (24.0)	610 (24.0)
VOC Emissions Test Method:			California 01350			

Table 5. *Product characteristics for NuVista Tiles.*

Characteristics			Average Value	Unit	Minimum Value	Maximum Value
Product Thickness:			54.0 (2.13)	mm (inch)	44.5 (1.75)	63.5 (2.5)
Product Weight:			31,735 (104)	g/m² (oz/ft²)	35,398 (116)	28,074 (92)
Product Form:	Tiles	Dimension:	610 (24.0)	mm (inch)	610 (24.0)	610 (24.0)
VOC Emissions Test Method:			California 01350			

Table 6. *Product characteristics for CushionWalk Pavers.*

Non-Interlocking Paver = 3.92 ft²						
Characteristics			Average Value	Unit	Minimum Value	Maximum Value
Product Thickness:			19.1 (0.750	mm (inch)	19.1 (0.750)	19.1 (0.750)
Product Weight:			19,631 (64.3)	g/m² (oz/ft²)	18,696 (61.3)	20,566 (67.4)
Product Form:	Tiles	Dimension:	603 (23.8)	mm (inch)	603 (23.8)	603 (23.8)
Interlocking Paver = 4.00 ft²						
Product Thickness:			19.1 (0.750)	mm (inch)	19.1 (0.750)	19.1 (0.750)
Product Weight:			20,445 (68.4)	g/m² (oz/ft²)	19,530 (65.4)	21,360 (71.5)
Product Form:	Tiles	Dimension:	610 (24.0)	mm (inch)	610 (24.0)	610 (24.0)

Table 7. *Product characteristics for Stride Fitness Tiles.*

Characteristics			Average Value	Unit	Minimum Value	Maximum Value
Product Thickness:			31.8 (1.25)	mm (inch)	25.4 (1.00)	38.0 (1.50)
Product Weight:			25,633 (84.0)	g/m^2 (oz/ft^2)	21,971 (72.0)	29,295 (96.0)
Product Form:	Tiles	Dimension:	610 (24.0)	mm (inch)	610 (24.0)	610 (24.0)
VOC Emissions Test Method:			California 01350			

ADDITIONAL ENVIRONMENTAL INFORMATION:

Dinoflex is a member of FIOSA-MIOSA Safety Alliance of British Columbia, a health and safety association for manufacturers and food processors.

LIFE CYCLE ASSESSMENT:

A cradle to grave life cycle assessment (LCA) was completed for this product group in accordance with ISO 14040, ISO 14044, and Product Category Rule for Environmental Product Declarations Flooring: Carpet, Resilient, Laminate, Ceramic, Wood (Version 2).

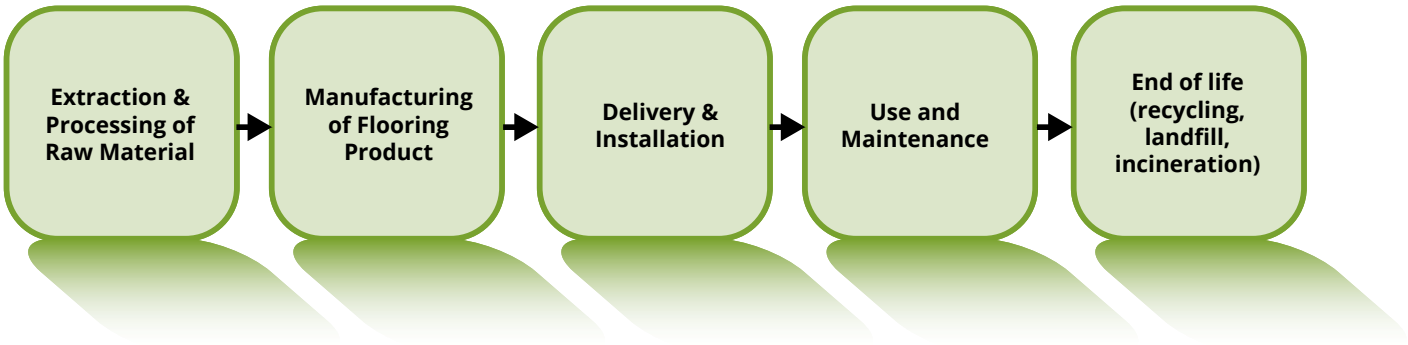

Figure 1. *A general representation of the scope of the LCA, including all life cycle stages from cradle-to-grave.*

The functional unit is according to the PCR the total impact for the expected life of the building (60 years). But the service life is depending on the product, which is either 10 or 20 years in this case. The PCR consequently requires separate reporting of LCA results A) for 1 m^2 of floor covering - extraction/processing, manufacturing, delivery&installation and end of life- and B) the average 1-year use stage, and C) for the 60 year life of the building as combined using A) and B), calculated from the reference service life RSL of the product.

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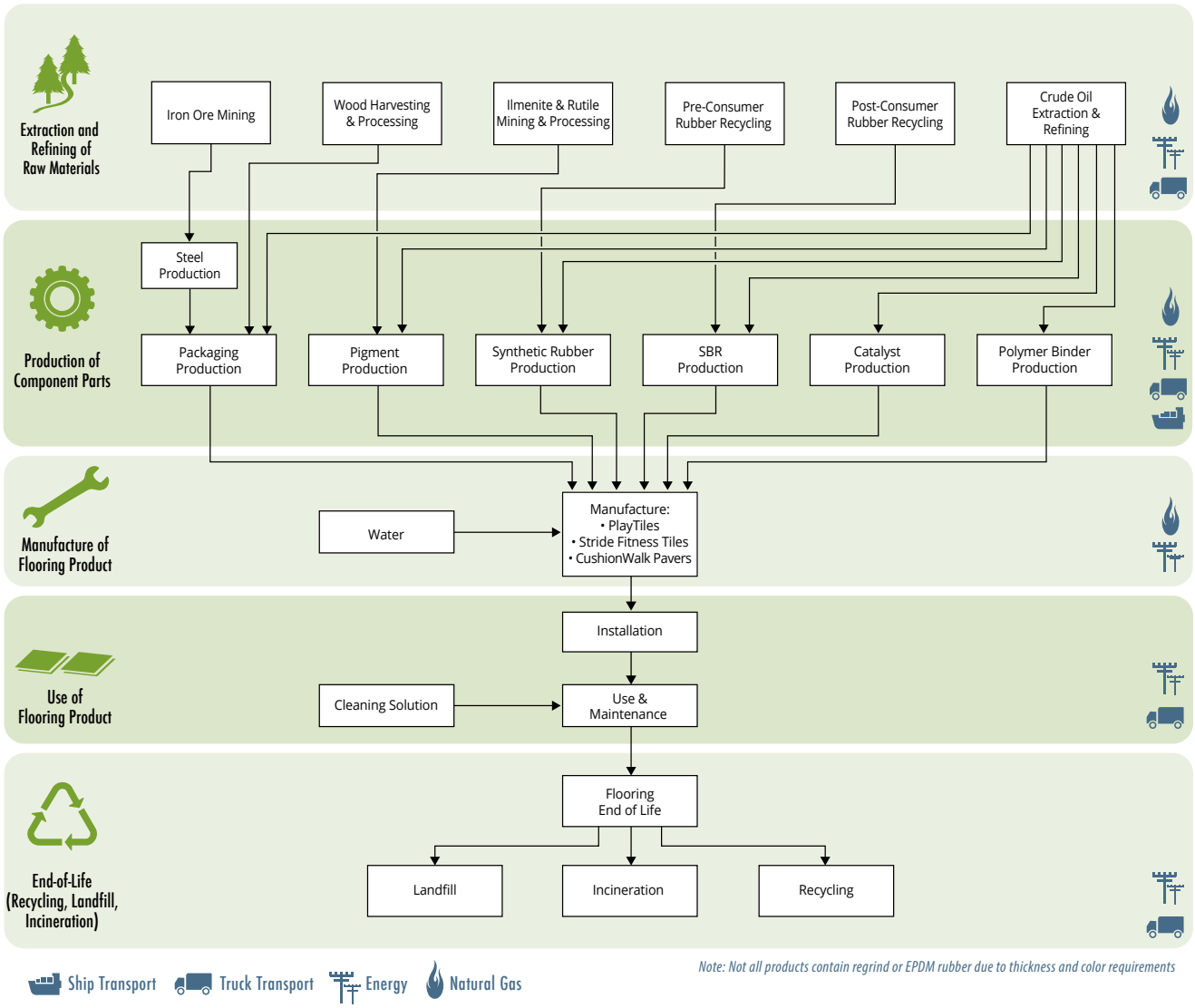
PRODUCT LIFE CYCLE FLOW DIAGRAM:

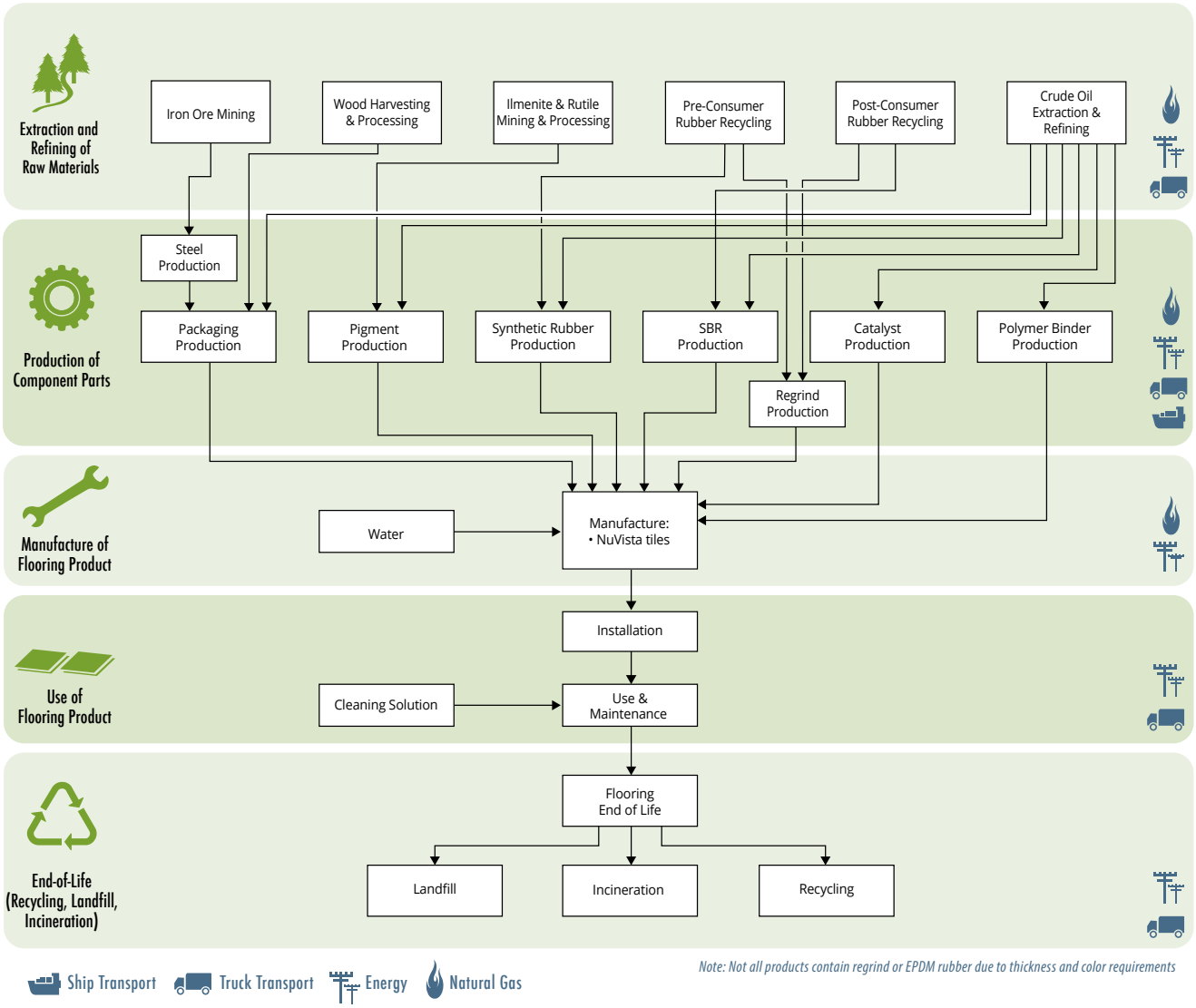
The diagrams below are a representation of the most significant contributions to the life cycle of Dinoflex's rubber tile goods. This includes resource extraction and processing, component manufacturing, assembly, use and maintenance, and end-of-life.

Product Life Cycle Flow Diagram for Dinoflex Dinoflex PlayTiles, Stride Fitness Tiles, and CushionWalk Pavers:



Note: Not all products contain regrind or EPDM rubber due to thickness and color requirements

Product Life Cycle Flow Diagram for for Dinoflex NuVista Tiles:



Note: Not all products contain regrind or EPDM rubber due to thickness and color requirements

LIFE CYCLE ASSESSMENT STAGES AND REPORTED EPD INFORMATION:

Sourcing/extraction (raw material acquisition) stage:

This stage includes extraction of virgin materials and reclamation of non-virgin feedstock. Resource use and emissions associated with both extraction of the raw materials and product component manufacturing are included. Upstream transportation is also included.

Manufacturing stage:

This stage includes all the relevant manufacturing processes and flows, excluding production of capital goods, infrastructure, production of manufacturing equipment, and personnel-related activities are not included. This stage includes the impacts from energy use and emissions associated with the processes occurring at the Salmon Arm, British Columbia, Canada facility. Energy use at the production facility is excluded unless used directly for the manufacturing process.

Delivery and installation stage:

Delivery

This stage includes the delivery of the rubber tiles to the point of installation (downstream transportation). Modeling used in the life cycle assessment used a conservative estimate for product distribution and assumed transport of 4,802 kilometers by diesel-fueled truck and 1,079 kilometers by ship.

Installation

Dinoflex tiles may be installed with or without adhesive (for interlocking tiles). For the LCA modeling, it is assumed that an adhesive is used for installation. The manufacturer recommends use of Chemrex Urethane 941, a one component polyurethane adhesive that is VOC compliant. The recommended application rate is approximately 0.86 kg/m^2. Product specific installation information is available at: http://www.dinoflex.com/resources

Waste

Waste generated during product installation can be disposed of in a landfill or incinerated.

Packaging

Table 8. *Packaging material table for Dinoflex tiles.*

Material	Units	PlayTiles	NuVista Tiles	CushionWalk Pavers	Stride Fitness Tiles
Pallet	tiles/pallet	56-100	80-88	160	96-100
Plastic Cozy Wrap	kg/m^2	0.014-0.029	0.015-0.016	0.0082	0.013-0.014
Metal Banding	kg/m^2	0.025-0.054	0.028-0.031	0.015	0.024-0.025
Saran Wrap	kg/m^2	0.038-0.082	0.042-0.046	0.023	0.037-0.063
Dunnage (Pine Boards)	kg/m^2	0.053-0.11	0.057-0.063	0.032	0.050-0.087
Pallet	kg/m^2	0.83-1.8	0.90-0.99	0.50	0.79-1.4

Use stage

Cleaning and maintenance

Table 9. *Cleaning and maintenance for Dinoflex tiles.*

Cleaning Process	Frequency	Material and Resource Use
Vacuuming	Initial, and weekly	Electricity – 1000W; 1 min/m^2
Damp Mopping	Initial, and weekly	Mild liquid detergent and water– 300:1 dilution

End-of-Life stage:

Recycling, reuse, or repurpose

Data for estimation of recycling rates for the product and packaging were taken from data prepared by the US Environmental Protection Agency's Municipal Solid Waste Report. These data provide recycling rates separately for containers and packaging, as well as for other goods and products.

Disposal

For materials not recycled at end of life, it is assumed 20% are incinerated, and 80% go to landfill, based on US Environmental Protection Agency's Municipal Solid Waste Report. Transportation of waste materials at end of life assumes a 20 mile average distance to disposal, consistent with assumptions used in the US EPA WARM model.

LIFE CYCLE INVENTORY:

In accordance with ISO 21930, the following aggregated inventory flows are included in the LCA, in addition to the LCIA and inventory flow requirements specified by the PCR:

- Use of renewable material resources
- Consumption of freshwater
- Hazardous Wastes
- Non-hazardous Wastes

All results are calculated using the SimaPro 8.0 model using primary and secondary inventory data. Classification for Use of Renewable Material Resources is based on review of elementary flows and resources considered renewable on a human time scale. Elementary flows related to use of wood, minerals, and land occupation were not included. Water consumption is not included, as it is reported separately. Based on this classification process, the use of renewable material resources for the product system is considered to be negligible.

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Table 10. *Results for aggregated inventory flows, shown per 1 m^2 of flooring maintained for 60 years.*

Parameter	Unit	PlayTiles	NuVista Tiles	CushionWalk Pavers	Stride Fitness Tiles
Consumption of Freshwater	kg	27,000	22,000	18,000	22,000
Hazardous Waste	kg	$2.6x10^{-3}$	$1.3x10^{-3}$	$1.2x10^{-3}$	$1.3x10^{-3}$
Non-hazardous Waste	kg	43	27	15	11

LIFE CYCLE IMPACT ASSESSMENT:

Life cycle impact assessment is the process of converting the life cycle inventory results into a representation of environmental and human health impacts. For example, emissions of carbon dioxide, methane, and nitrous oxide (inventory) together contribute to climate change (impact assessment). The impact assessment for the EPD is conducted in accordance with requirements of the Product Category Rule (PCR). Impact category indicators were estimated using the CML 2001 (Oct 2013, v. 3.0) characterization method. Aggregated inventory flows were also calculated including energy use and waste generation. The LCIA and inventory flow results were calculated using SimaPro 8.0.2 software.

Dinoflex flooring are available in a range of thicknesses and color options. For each product line, at least two versions of the product, representing an upper and lower extreme for the product line, were included in the LCA model. Table 15 shows the range in life cycle impact assessment results for the product line. Table 16 through Table 19 show results for 1 m^2 of flooring, including extraction of raw materials through installation and end of life. Table 20 shows the average use stage impacts for 1 m^2 of flooring over 1 year. Table 21 lists the assumptions used for product maintenance over the Reference Service Life (RSL). Table 22 through Table 25 show the life cycle impact assessment results for 1 m^2 of flooring over a 60 year period.

Table 11. *Range in life cycle impact assessment results for 1 m^2 of flooring covering maintained for 60 years.*

Impact Category	Units	CushionWalk		NuVista		PlayTiles		Stride	
		Min	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*
Global warming, 100 year time horizon	kg $C0_2$ eq	200	260	320	410	320	1,300	350	530
Acidification Potential	kg SO_2 eq	1.5	1.7	1.7	2.1	1.5	4.9	1.8	2.4
Ozone Depletion Potential	kg CFC-11 eq	$5.1x10^{-6}$	$1.8x10^{-5}$	$8.6x10^{-6}$	$2.3x10^{-5}$	$1.1x10^{-5}$	$6.3x10^{-5}$	$8.3x10^{-6}$	$2.5x10^{-5}$
Photochemical oxidation	kg C_2H_4 eq	$8.5x10^{-2}$	0.10	0.11	0.13	$9.6x10^{-2}$	0.31	0.11	0.15
Eutrophication Potential	kg PO_4^{3-} eq	0.28	0.36	0.47	0.60	0.5	2.0	0.55	0.81
Abiotic depletion, elements	kg Sb eq	$1.6x10^{-4}$	$1.5x10^{-3}$	$1.9x10^{-4}$	$1.7x10^{-3}$	$1.9x10^{-4}$	$3.8x10^{-3}$	$2.1x10^{-4}$	$1.6x10^{-3}$
Abiotic depletion, fossil fuels	MJ	3,200	4,900	4,200	6,200	4,200	16,000	4,900	7,700

Table 12. *Cradle to Install and End of life for an average 1 m² PlayTiles. (Table A of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	34	7.4	11	35	88
Acidification Potential	kg SO_2 eq	0.15	$2.9x10^{-2}$	$5.1x10^{-2}$	$6.6x10^{-3}$	0.23
Ozone depletion potential	kg CFC-11 eq	$2.9x10^{-6}$	$7.4x10^{-7}$	$5.4x10^{-8}$	$1.3x10^{-7}$	$3.8x10^{-6}$
Photochemical oxidation	kg C_2H_4 eq	$8.1x10^{-3}$	$1.5x10^{-3}$	$2.3x10^{-3}$	$4.0x10^{-3}$	$1.6x10^{-2}$
Eutrophication Potential	kg PO_4^{3-} eq	$4.3x10^{-2}$	$9.1x10^{-3}$	$1.0x10^{-2}$	$7.9x10^{-2}$	0.14
Abiotic depletion, elements	kg Sb eq	$1.6x10^{-4}$	$2.5x10^{-6}$	$4.5x10^{-8}$	$1.6x10^{-6}$	$1.7x10^{-4}$
Abiotic depletion, fossil fuels	MJ	640	130	140	15	920
Renewable Energy	MJ	19	49	0.11	0.79	69
Non-renewable Energy	MJ	750	150	150	19	1,100

Table 13. *Cradle to Install and End of life for an average 1 m² NuVista Tiles. (Table A of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	25	6.5	9.3	29	70
Acidification Potential	kg SO_2 eq	0.11	$2.4x10^{-2}$	$4.3x10^{-2}$	$5.5x10^{-3}$	0.18
Ozone depletion potential	kg CFC-11 eq	$2.8x10^{-6}$	$6.6x10^{-7}$	$4.6x10^{-8}$	$1.1x10^{-7}$	$3.6x10^{-6}$
Photochemical oxidation	kg C_2H_4 eq	$6.2x10^{-3}$	$1.3x10^{-3}$	$1.9x10^{-3}$	$3.4x10^{-3}$	$1.3x10^{-2}$
Eutrophication Potential	kg PO_4^{3-} eq	$2.9x10^{-2}$	7.7x10-$^{-3}$	$8.7x10^{-3}$	$6.6x10^{-2}$	0.11
Abiotic depletion, elements	kg Sb eq	$2.0x10^{-4}$	$2.0x10^{-6}$	$3.8x10^{-8}$	$1.4x10^{-6}$	$2.0x10^{-4}$
Abiotic depletion, fossil fuels	MJ	520	110	120	12	760
Renewable Energy	MJ	13	40	$9.0x10^{-2}$	0.65	53
Non-renewable Energy	MJ	610	130	130	16	880

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Table 14. *Cradle to Install and End of life for an average 1 m² CushionWalk Pavers. (Table A of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	20	4.8	5.2	16	46
Acidification Potential	kg SO_2 eq	$8.9x10^{-2}$	$1.7x10^{-2}$	$2.4x10^{-2}$	$3.1x10^{-3}$	0.13
Ozone depletion potential	kg CFC-11 eq	$2.2x10^{-6}$	$4.9x10^{-7}$	$2.6x10^{-8}$	$6.3x10^{-8}$	$2.8x10^{-6}$
Photochemical oxidation	kg C_2H_4 eq	$4.8x10^{-3}$	$8.7x10^{-4}$	$1.1x10^{-3}$	$1.9x10^{-3}$	$8.6x10^{-3}$
Eutrophication Potential	kg PO_4^{3-} eq	$2.6x10^{-2}$	$5.3x10^{-3}$	$4.9x10^{-3}$	$3.7x10^{-2}$	$7.2x10^{-2}$
Abiotic depletion, elements	kg PO_4^{3-} eq	$1.6x10^{-4}$	$1.4x10^{-6}$	$2.1x10^{-8}$	$7.6x10^{-7}$	$1.7x10^{-4}$
Abiotic depletion, fossil fuels	MJ	410	78	66	6.8	560
Renewable Energy	MJ	11	25	$5.0x10^{-2}$	0.37	37
Non-renewable Energy	MJ	470	92	72	8.7	640

Table 15. *Cradle to Install and End of life for an average 1 m² Stride Fitness Tiles. (Table A of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	22	5.0	8.0	25	60
Acidification Potential	kg SO_2 eq	$9.2x10^{-2}$	$1.9x10^{-2}$	$3.7x10^{-2}$	$4.7x10^{-3}$	0.15
Ozone depletion potential	kg CFC-11 eq	$2.0x10^{-6}$	$5.0x10^{-7}$	$3.9x10^{-8}$	$9.6x10^{-8}$	$2.6x10^{-6}$
Photochemical oxidation	kg C_2H_4 eq	$5.2x10^{-3}$	$1.0x10^{-3}$	$1.6x10^{-3}$	$2.9x10^{-3}$	$1.1x10^{-2}$
Eutrophication Potential	kg PO_4^{3-} eq	$2.8x10^{-2}$	$6.0x10^{-3}$	$7.5x10^{-3}$	$5.6x10^{-2}$	$9.8x10^{-2}$
Abiotic depletion, elements	kg PO_4^{3-} eq	$1.3x10^{-4}$	$1.6x10^{-6}$	$3.2x10^{-8}$	$1.2x10^{-6}$	$1.3x10^{-4}$
Abiotic depletion, fossil fuels	MJ	430	83	100	10	630
Renewable Energy	MJ	13	32	$7.7x10^{-2}$	0.56	45
Non-renewable Energy	MJ	510	97	110	13	730

Table 16. *Average 1 year use stage impacts for 1 m^2 flooring. (Table B of the PCR)*

Impact Category	Units	Use & Maintenance			
		PlayTiles	NuVista Tiles	CushionWalk Pavers	Stride Fitness Tiles
Global warming, 100 year time horizon	kg CO_2 eq	1.4	1.4	1.4	1.4
Acidification Potential	kg SO_2 eq	$2.0x10^{-2}$	$2.0x10^{-2}$	$2.0x10^{-2}$	$2.0x10^{-2}$
Ozone depletion potential	kg CFC-11 eq	$2.4x10^{-8}$	$2.4x10^{-8}$	$2.4x10^{-8}$	$2.4x10^{-8}$
Photochemical oxidation	kg C_2H_4 eq	$1.1x10^{-3}$	$1.1x10^{-3}$	$1.1x10^{-3}$	$1.1x10^{-3}$
Eutrophication Potential	kg PO_4^{3-} eq	$1.6x10^{-3}$	$1.6x10^{-3}$	$1.6x10^{-3}$	$1.6x10^{-3}$
Abiotic depletion, elements	kg Sb eq	$2.0x10^{-6}$	$2.0x10^{-6}$	$2.0x10^{-6}$	$2.0x10^{-6}$
Abiotic depletion, fossil fuels	MJ	37	37	37	37
Renewable Energy	MJ	4.0	4.0	4.0	4.0
Non-renewable Energy	MJ	40	40	40	40

Table 17. *List of use and maintenance activities over the Reference Service Life (RSL).*

Maintenance Activity	Frequency over user defined RSL of product			
	PlayTiles	NuVista Tiles	CushionWalk Pavers	Stride Fitness Tiles
Initial Cleaning	Once over 10 year RSL	Once over 20 year RSL	Once over 20 year RSL	Once over 10 year RSL
Weekly Cleaning	Up to 520 times over 10 year RSL	Up to 1,040 times over 20 year RSL	Up to 1,040 times over 20 year RSL	Up to 520 times over 10 year RSL

Table 18. *PlayTiles: Life cycle stage impacts for an average building life of 60 years. (Table C of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	200	45	67	210	82	610
Acidification Potential	kg SO_2 eq	0.88	0.17	0.31	0.04	1.2	2.6
Ozone depletion potential	kg CFC-11 eq	$1.7x10^{-5}$	$4.4x10^{-6}$	$3.3x10^{-7}$	$8.1x10^{-7}$	$1.4x10^{-6}$	$2.4x10^{-5}$
Photochemical oxidation	kg C_2H_4 eq	$4.9x10^{-2}$	$9.2x10^{-3}$	$1.4x10^{-2}$	$2.4x10^{-2}$	$6.5x10^{-2}$	0.16
Eutrophication Potential	kg PO_4^{3-} eq	0.26	$5.4x10^{-2}$	$6.3x10^{-2}$	0.47	$9.5x10^{-2}$	0.94
Abiotic depletion, elements	kg Sb eq	$9.8x10^{-4}$	$1.5x10^{-5}$	$2.7x10^{-7}$	$9.9x10^{-6}$	$1.2x10^{-4}$	$1.1x10^{-3}$
Abiotic depletion, fossil fuels	MJ	3800	750	840	87	2,200	7,700
Renewable Energy	MJ	110	290	0.64	4.7	240	650
Non-renewable Energy	MJ	4,500	880	920	110	2,400	8,800

Table 19. *NuVista Tiles: Life cycle stage impacts for an average building life of 60 years. (Table C of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	100	26	37	120	82	360
Acidification Potential	kg SO_2 eq	0.44	$9.7x10^{-2}$	0.17	$2.2x10^{-2}$	1.2	1.9
Ozone depletion potential	kg CFC-11 eq	$1.1x10^{-5}$	$2.6x10^{-6}$	$1.8x10^{-7}$	$4.5x10^{-7}$	$1.4x10^{-6}$	$1.6x10^{-5}$
Photochemical oxidation	kg C_2H_4 eq	$2.5x10^{-2}$	$5.1x10^{-3}$	$7.6x10^{-3}$	$1.3x10^{-2}$	$6.5x10^{-2}$	0.12
Eutrophication Potential	kg PO_4^{3-} eq	0.11	$3.1x10^{-2}$	$3.5x10^{-2}$	0.26	$9.5x10^{-2}$	0.54
Abiotic depletion, elements	kg Sb eq	$7.9x10^{-4}$	$8.2x10^{-6}$	$1.5x10^{-7}$	$5.5x10^{-6}$	$1.2x10^{-4}$	$9.2x10^{-4}$
Abiotic depletion, fossil fuels	MJ	2100	430	470	48	2,200	5,200
Renewable Energy	MJ	52	160	0.36	2.6	240	450
Non-renewable Energy	MJ	2,400	510	510	62	2,400	5,900

Table 20. *CushionWalk Pavers: Life cycle stage impacts for an average building life of 60 years. (Table C of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	60	14	16	49	82	220
Acidification Potential	kg SO_2 eq	0.27	$5.0x10^{-2}$	$7.2x10^{-2}$	$9.2x10^{-3}$	1.2	1.6
Ozone depletion potential	kg CFC-11 eq	$6.6x10^{-6}$	$1.5x10^{-6}$	$7.7x10^{-8}$	$1.9x10^{-7}$	$1.4x10^{-6}$	$9.7x10^{-6}$
Photochemical oxidation	kg C_2H_4 eq	$1.4x10^{-2}$	$2.6x10^{-3}$	$3.2x10^{-3}$	$5.6x10^{-3}$	$6.5x10^{-2}$	$9.1x10^{-2}$
Eutrophication Potential	kg PO_4^{3-} eq	$7.7x10^{-2}$	$1.6x10^{-2}$	$1.5x10^{-2}$	0.11	$9.5x10^{-2}$	0.31
Abiotic depletion, elements	kg Sb eq	$4.9x10^{-4}$	$4.1x10^{-6}$	$6.3x10^{-8}$	$2.3x10^{-6}$	$1.2x10^{-4}$	$6.2x10^{-4}$
Abiotic depletion, fossil fuels	MJ	1,200	230	200	20	2,200	3,800
Renewable Energy	MJ	34	75	0.15	1.1	240	350
Non-renewable Energy	MJ	1,400	280	220	26	2,400	4,300

Table 21. *Stride Fitness Tiles: Life cycle stage impacts for an average building life of 60 years. (Table C of the PCR)*

Impact Category	Units	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End of Life	Total
Global warming, 100 year time horizon	kg CO_2 eq	130	30	48	150	82	440
Acidification Potential	kg SO_2 eq	0.55	0.11	0.22	$2.8x10^{-2}$	1.2	2.1
Ozone depletion potential	kg CFC-11 eq	$1.2x10^{-5}$	$3.0x10^{-6}$	$2.3x10^{-7}$	$5.8x10^{-7}$	$1.4x10^{-6}$	$1.7x10^{-5}$
Photochemical oxidation	kg C_2H_4 eq	$3.1x10^{-2}$	$6.1x10^{-3}$	$9.8x10^{-3}$	$1.7x10^{-2}$	$6.5x10^{-2}$	0.13
Eutrophication Potential	kg PO_4^{3-} eq	0.17	$3.6x10^{-2}$	$4.5x10^{-2}$	0.34	$9.5x10^{-2}$	0.68
Abiotic depletion, elements	kg Sb eq	$7.8x10^{-4}$	$9.7x10^{-6}$	$1.9x10^{-7}$	$7.1x10^{-6}$	$1.2x10^{-4}$	$9.2x10^{-4}$
Abiotic depletion, fossil fuels	MJ	2,600	500	600	62	2,200	5,900
Renewable Energy	MJ	75	190	0.46	3.4	240	510
Non-renewable Energy	MJ	3,000	590	660	80	2,400	6,700

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SUPPORTING TECHNICAL INFORMATION:

Data sources:

Table 22. *Data sources used for the LCA.*

Material	Data Source	Flow Name	Date
Product Manufacture	Primary data (Dinoflex)	various	2013
Rubber, SBR	Primary data; Ecoinvent[1]	SBR - Regrind, recycled (/kg); Synthetic rubber, at plant/RER	2014; 2003
Rubber, EPDM	Primary data; Ecoinvent	EPDM – 18% RC (/kg); Synthetic rubber, at plant/RER	2014; 2003
Binder	Ecoinvent	Methylene diphenyl diisocyanate, at plant/RER	2010
Catalyst	Primary data; Ecoinvent	Chemicals organic, at plant/GLO	2010
Rubber, EPDM, Regrind	Primary data; Ecoinvent	EPDM – 86-100% RC (/kg); Synthetic rubber, at plant/ RER	2014; 2003
Pigment	Ecoinvent	Titanium dioxide, production mix, at plant/RER	2003
Cleanser	US LCI; Ecoinvent	Liquid laundry detergent/US; tap water, at user /RER	2012; 2005
Packaging			
Plastic Wrap	Ecoinvent	Packaging film, LDPE, at plant/RER[1]	2003
Metal Banding	Ecoinvent	Steel, converter, un-alloyed at plant/RER	2011; 2007
Packaging Film	Ecoinvent	Packaging film, LDPE, at plant/RER[1]	2007
Padding/Support	Ecoinvent	Surface dried lumber, at planer mill, US PNW/kg/US	2003; 2003
Pallet	US LCI	Pallet (22kg)/US - US-EI[2]	2003
Transportation			
Truck	US LCI	Transport, combination truck, diesel powered/US	2008
Ship	US LCI	Transport, transoceanic freight ship/OCE	2008

Data Quality:

Table 23. *Data Quality of Life Cycle Inventory Table.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data should be collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2003 or more recent). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on 2013 annual production.
Geographical Coverage: Geographical area from which data for unit processes should be collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Actual processes for upstream operations are primarily North American. Surrogate data used in the assessment are representative of North American or European operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing product disposal are based on US statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed.	Precision of results are not quantified due to a minimal amount of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the rubber flooring products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded. In total, these missing data represent less than 5% of the mass or energy flows.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest.	Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis.	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent data where available. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in the United States.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the data: Data quality assessment examples include (but not limited to) USLCI and ILCD.	Data representing energy use at the Dinoflex manufacturing facility represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI datasets, both Ecoinvent and the US LCI data are used, with a bias towards Ecoinvent data.
Uncertainty of the information: E.g. data, models, and assumptions.	Uncertainty related to the rubber flooring product materials and packaging is low. Actual supplier data for upstream operations was sought but not available for all suppliers and the study relied upon use of existing representative datasets. These datasets contained relatively recent data (<10 years), but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

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Allocation:

Resource use at the Salmon Arm, British Columbia facility (e.g., water and energy) was allocated to the product based on the unit price as a fraction of the total facility sales. Sales price data for each of the products considered in the assessment were provided by the manufacturer along with total annual sales and used to allocate resource use and emissions to each of the assessed products.

The Dinoflex flooring product system includes recycled materials, which were allocated using the recycled content allocation method (also known as the 100-0 cut off method). Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At end of life, materials which are recycled leave the system boundaries with no additional burden.

Impacts from transportation, including product distribution to point of sale, were allocated based on the mass of material and distance transported.

System boundaries:

The life cycle assessment for Dinoflex rubber tile products was a cradle to grave study. The system boundaries for this study are as follows:

- **Sourcing/extraction stage –** This stage includes extraction of virgin materials and reclamation of non-virgin feedstock. Resource use and emissions associated with both extraction of the raw materials product component manufacturing are included. Upstream transportation is also included.
- **Manufacturing stage –** This stage includes all the relevant manufacturing processes and flows, including packaging. Production of capital goods, infrastructure, production of manufacturing equipment, and personnel-related activities are not included.
- **Delivery and installation stage –** This stage includes the delivery of the product to the point of installation.
- **Use stage –** The use stage includes the cleaning and maintenance of the floor covered during its lifetime, as well as extraction, manufacturing and transport of all sundry material for maintenance and cleaning.
- **End of life stage –** The end of life stage includes the transport of the floor covering to end of life processes including landfill, incineration, and recycling.

Cut-off criteria:

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact must be included in the inventory. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

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